PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 03 May 2000 (03.05.00)	
International application No. PCT/US99/20046	**Applicant's or agent's file reference** 1528-372-1PC
International filing date (day/month/year) 31 August 1999 (31.08.99)	**Priority date** (day/month/year) 01 September 1998 (01.09.98)
Applicant KASTAN, Ira et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

24 March 2000 (24.03.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

US9920046

M.H.

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 :
C12N 15/12, A61K 38/17, 31/70, C07K 16/18, A61K 35/14, 39/395, G01N 33/53, C12Q 1/68

A1

(11) International Publication Number: WO 00/12706

(43) International Publication Date: 9 March 2000 (09.03.00)

(21) International Application Number: PCT/US99/20046

(22) International Filing Date: 31 August 1999 (31.08.99)

(30) Priority Data:
60/098,993 1 September 1998 (01.09.98) US

(71) Applicant *(for all designated States except US)*: THE GOVERNMENT OF THE UNITED STATES OF AMERICA as represented by THE SECRETARY OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES [US/US]; Bethesda, MD 20892 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: PASTAN, Ira [US/US]; 11710 Beall Mountain Road, Potomac, MD 20854 (US). BRINKMANN, Ulrich [DE/DE]; Waxensteinstraße 20, D-82347 Bernreid (DE). VASMATZIS, George [GR/US]; 12309 Village Square Terrace, Rockville, MD 20852 (US). LEE, Byungkook [US/US]; 10711 Sandy Landing Road, Potomac, MD 20854 (US).

(74) Agents: HYMAN, Laurence, J. et al.; Townsend And Townsend and Crew Llp, 8th Floor, Two Embarcadero Center, San Francisco, CA 94111-3834 (US).

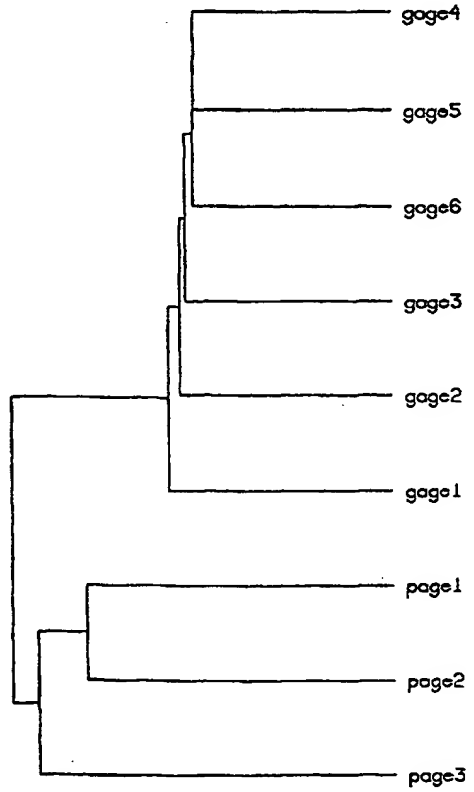
(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: PAGE-4, AN X-LINKED GAGE-LIKE GENE EXPRESSED IN NORMAL AND NEOPLASTIC PROSTATE, TESTIS AND UTERUS, AND USES THEREFOR

(57) Abstract

PAGE-4 is a gene preferentially expressed in normal male and female reproductive tissues, prostate, testis, fallopian tube, uterus and placenta, as well as in prostate cancer, testicular cancer and uterine cancer. This expression pattern makes it a target for diagnosis and for vaccine based therapy of neoplasms of prostate, testis and uterus. The invention provides immunogenic compositions comprising PAGE-4 protein or immunogenic peptides thereof, methods of inhibiting the growth of malignant cells expressing PAGE-4, and methods of inducing an enhanced immune response to PAGE-4-expressing cancers.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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ENT COOPERATION TREAT.

From the INTERNATIONAL SEARCHING AUTHORITY

TOWNSEND & TOWNSEND & CREW

00 FEB 22 AM 10:19

RECEIVED

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

To:
TOWNSEND AND TOWNSEND AND CREW LLP
Attn. HYMAN, L.J.
Two Embarcadero Center
Eighth Floor
San Francisco, CA 94111
UNITED STATES OF AMERICA

Date of mailing *(day/month/year)*	17/02/2000
Applicant's or agent's file reference: 1528-372-1PC	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No.: PCT/US 99/ 20046	International filing date *(day/month/year)* 31/08/1999
Applicant: THE GOVERNMENT OF THE U.S. OF A. ... et al.	

1. [X] The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority: European Patent Office, P.B. 5818 Patentlaan 2, NL-2280 HV Rijswijk, Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer: Mireille Claudepierre

Form PCT/ISA/220 (July 1998)

DOCKETED

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped),whether

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international appplication is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

TENT COOPERATION TREAT

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
1528-372-1PC		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 99/ 20046	31/08/1999	01/09/1998

Applicant

THE GOVERNMENT OF THE U.S. OF A. ... et al.

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   [ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

   b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

   [ ] contained in the international application in written form.

   [ ] filed together with the international application in computer readable form.

   [X] furnished subsequently to this Authority in written form.

   [X] furnished subsequently to this Authority in computer readble form.

   [X] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   [X] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [X] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

   [X] the text is approved as submitted by the applicant.

   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. 3

   [ ] as suggested by the applicant.

   [X] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 99/ 20046

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. [X] Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210

2. [ ] Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. [ ] Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. [ ] As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. [ ] As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. [ ] As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. [ ] No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

[ ] The additional search fees were accompanied by the applicant's protest.

[ ] No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.1

Although claims 32, and 30 and 31 in as far as they relate to in vivo use, are directed to a diagnostic method practised on the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

Although claims 15-18, and claims 14 and 19-29 in as far as they relate to in vivo use, are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/20046

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N15/12 A61K38/17 A61K31/70 C07K16/18 A61K35/14
A61K39/395 G01N33/53 C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K C07K C12N G01N C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE EMBL - EMHUM2 'Online! Entry HSA005894, Acc.no. AJ005894, 1 May 1998 (1998-05-01) STROM, T.M. ET AL.: "Homo sapiens mRNA for JM27 protein, complete CDS (clone image 145745 and image 257878)." XP002129838 the whole document	13,33, 34,51
A	WO 98 32855 A (GODELAINE DANIELE ;LETHE BERNARD (BE); LUCAS SOPHIE (BE); SMET CHA) 30 July 1998 (1998-07-30) the whole document, particularly the claims.	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 February 2000	17/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Smalt, R

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

...on on patent family members

...national Application No
.../US 99/20046

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9832855 A	30-07-1998	US 5811519 A	22-09-1998
		AU 6042198 A	18-08-1998
		EP 0970206 A	12-01-2000
		ZA 9800656 A	17-08-1998

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
1528-372-1PC		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US99/20046	31/08/1999	01/09/1998
International Patent Classification (IPC) or national classification and IPC C12N15/12		
Applicant THE GOVERNMENT OF THE U.S. OF A. ... et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
24/03/2000	28.12.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Armandola, E Telephone No. +49 89 2399 7493

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US99/20046

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

1-45 as originally filed

Claims, No.:

1-52 with telefax of 20/09/2000

Drawings, No.:

1-5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)
   see separate sheet

6. Additional observations, if necessary:

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

   ☐ the entire international application.

   ☒ claims Nos. 14-29, 32 (Industrial Applicability).

because:

   ☒ the said international application, or the said claims Nos. 14-29, 32 relate to the following subject matter which does not require an international preliminary examination (*specify*):
   see separate sheet

   ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

   ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

   ☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination report cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

   ☐ the written form has not been furnished or does not comply with the standard.

   ☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

   Novelty (N) Yes: Claims 1-51

	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-51
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-13, 30, 31, 33-51
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item I

Basis of the Report

This report has been established without taking into consideration amended Claim 52 (introduced by the applicant with the amendments filed with the fax of September 20th, 2000) as the Claim contains subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following: a kit for the detection of a PAGE-4 gene in a sample taken from a non-reproductive tissue was not disclosed in the application as filed.

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

Industrial Applicability (Art 33 (4) PCT)

Claims 14-29 and 32 relate to subject-matter considered by this Authority to be covered by the provisions of Rule 67.1(iv) PCT. Consequently, no opinion will be formulated with respect to the industrial applicability of the subject-matter of these claims (Art. 34(4)(a)(i) PCT).

For the assessment of the present Claims 14-29 and 32, with regard to methods of treatment of the human body and to the application of such methods in vivo, on the question whether they are industrially applicable, no unified criteria exist in the PCT Contracting States. The patentability can also be dependent upon the formulation of the claim. The EPO, for example, does not recognize as industrially applicable the subject-matter of claims to the use of a compound in medical treatment, but may allow, however, claims to a known compound for first use in medical treatment and the use of such a compound for the manufacture of a medicament for a new medical treatment.

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: DATABASE EMBL - EMHUM2 [Online] Entry HSA005894, Acc.no. AJ005894, 1 May 1998 (1998-05-01) STROM, T.M. ET AL.: 'Homo sapiens mRNA for JM27 protein, complete CDS (clone image 145745 and image 257878).' XP002129838

Novelty and Inventive step (Art.33 (2)(3) PCT)
Claims 1-51 can be considered novel and inventive. A protein and a nucleotide corresponding to PAGE-4 (SEQ. ID. NO: 1 and NO: 13, respectively) were known from D1 (JM27 gene). D1, however, does not provide any hint on the function of JM27/PAGE-4 that might prompt the skilled person to produce an immunogenic/pharmaceutical composition comprising JM27/PAGE-4 or to exploit this molecule to develop a method to inhibit the growth of malignant cells or to detect the presence of JM27/PAGE-4.

Re Item VII
Certain defects in the international application

Claim 51 seems to be the exact duplicate of Claim 34 and is, thus, redundant.

WHAT IS CLAIMED IS:

1. An immunogenic composition comprising an isolated PAGE-4 protein.

2. An immunogenic composition of claim 1, further comprising a pharmaceutically acceptable carrier.

3. An immunogenic composition comprising an isolated peptide of a PAGE-4 protein, wherein said peptide binds with an MHC molecule.

4. An immunogenic composition of claim 3, further comprising a pharmaceutically acceptable carrier.

5. An immunogenic composition of claim 3, wherein the isolated peptide consists of nine to eleven amino acids.

6. An immunogenic composition of claim 4, wherein the isolated peptide is conjugated to a lipid.

7. An immunogenic composition of claim 1, further comprising two or more of a stabilizing detergent, a micelle-forming agent, and an oil.

8. An immunogenic composition of claim 3, further comprising two or more of a stabilizing detergent, a micelle-forming agent, and an oil.

9. An immunogenic composition comprising an isolated nucleic acid encoding a PAGE-4 protein.

10. An immunogenic composition of claim 9, loaded on a gold microsphere.

11. An immunogenic composition of claim 9, wherein the isolated nucleic acid further comprises a heterologous promoter.

12. An immunogenic composition comprising an isolated nucleic acid encoding eight or more contiguous amino acids of a PAGE-4 protein or conservative modifications thereof.

13. An isolated PAGE-4 peptide which induces a cytotoxic T lymphocyte response when bound to a MHC class I molecule.

14. A method for inhibiting the growth of a malignant cell expressing PAGE-4, comprising,

(i) culturing cytotoxic T lymphocytes (CTLs) or CTL precursor cells with a PAGE-4 protein or an immunogenic PAGE-4 peptide, thus activating the CTLs or CTL precursors to recognize a PAGE-4-expressing cell, and

(ii) contacting the malignant cell with the activated CTLs or CTLs matured from the CTL precursors,

thereby inhibiting the growth of the malignant cell.

15. A method for inhibiting the growth of a malignant cell expressing PAGE-4 in a mammal with a malignancy comprising PAGE-4-expressing cells, the method comprising,

(i) obtaining cytotoxic T lymphocytes (CTLs) or CTL precursor cells from the mammal,

(ii) culturing the CTLs or CTL precursors with a PAGE-4 protein or an immunogenic PAGE-4 peptide, thus activating the CTLs or CTL precursors to recognize a PAGE-4-expressing cell, and

(iii) introducing the activated CTLs or CTL precursors into the mammal, thereby inhibiting the growth of the malignant cell.

16. A method for inhibiting the growth of a malignant cell expressing PAGE-4 in a mammal with a malignancy comprising PAGE-4-expressing cells, the method comprising,

(i) obtaining antigen presenting cells (APCs) and cytotoxic T lymphocytes (CTLs) or CTL precursor cells from the mammal,

(ii) transducing the APCs with a nucleic acid encoding a PAGE-4 protein or an immunogenic PAGE-4 peptide,

(iii) culturing the APC with the CTLs or CTL precursors, thus activating the CTLs or CTL precursors to recognize a PAGE-4-expressing cell, and

(iv) introducing the activated CTLs or CTL precursors into the mammal, thereby inhibiting the growth of the malignant cell.

17. A method for inhibiting the growth of a malignant cell expressing PAGE-4 in a mammal with a malignancy comprising PAGE-4-expressing cells, the method comprising, introducing into the mammal a PAGE-4 protein or immunogenic PAGE-4 peptides in an amount sufficient to induce activation of cytotoxic T lymphocytes against PAGE-4 expressing cells, thereby inhibiting the growth of the malignant cell.

18. A method for inhibiting the growth of a malignant cell expressing PAGE-4 in a mammal with a malignancy comprising PAGE-4-expressing cells, the method comprising, introducing into the mammal nucleic acids encoding PAGE-4 protein or an immunogenic PAGE-4 peptide, whereby the nucleic acids are expressed in cells of the mammal, thereby activating a cytotoxic T lymphocyte response to cells expressing PAGE-4, thereby inhibiting the growth of the malignant cell.

19. A method for inhibiting the growth of a malignant cell expressing PAGE-4, said method comprising:

contacting said malignant cell with an effective amount of a cell-growth inhibiting molecule, which molecule comprises an antibody which specifically binds PAGE-4 on a malignant cell, and an effector molecule which inhibits the growth of cells to which the cell growth inhibiting molecule is targeted, thereby inhibiting the growth of that cell.

20. The method of claim 19, wherein said antibody is a monoclonal antibody.

21. The method of claim 19, wherein the effector molecule is a chemotherapeutic agent.

22. The method of claim 19, wherein the effector molecule comprises a toxic moiety.

23. The method of claim 22, wherein the toxic moiety is selected from the group consisting of ricin A, abrin, diphtheria toxin or a subunit thereof, *Pseudomonas* exotoxin or a portion thereof, and botulinum toxins A through F.

24. The method of claim 22, wherein the *Pseudomonas* exotoxin is selected from the group consisting of PE35, PE37, PE38, and PE40.

25. The method of claim 19, wherein said malignant cell is selected from a cell of the group of malignancies consisting of a prostate cancer, a testicular cancer, and a uterine cancer.

26. The method of claim 25, wherein the malignant cell is a prostate cancer cell.

27. The method of claim 25, wherein said malignant cell is a testicular cancer cell.

28. The method of claim 25, wherein said malignant cell is an uterine cancer cell.

29. A method for inhibiting the growth of a malignant cell expressing PAGE-4, said method comprising:

contacting said malignant cell with an inhibitorily effective amount of a nucleic acid which specifically binds to nucleic acids in cells encoding PAGE-4, thereby inhibiting the growth of said cell.

30. A method for detecting the presence of PAGE-4 in a biological sample, said method comprising:

(i) contacting said biological sample with an anti-PAGE-4 antibody which specifically binds to cells expressing PAGE-4; and

(ii) allowing said antibody to bind to PAGE-4 under immunologically reactive conditions, wherein detection of said bound antibody indicates the presence of said PAGE-4.

31. The method of claim 30, wherein said antibody is detectably labeled.

32. The method of claim 30, wherein the method is performed *in vivo* in a mammal.

33. A method for detecting the presence of PAGE-4 in a biological sample containing nucleic acids, said method comprising:

(i) contacting said biological sample with a first nucleic acid sequence which is complementary to a nucleic acid sequence encoding PAGE-4; and

(ii) incubating the first nucleic acid sequence with the nucleic acid sequences of the biological sample under conditions permitting specific hybridization, and

(iii) detecting any hybridization between the first nucleic acid

sequence and the nucleic acids of the sample, wherein detection of said hybridization indicates the presence of PAGE-4 in the sample.

34. The method of claim 33, wherein the detection of said hybridization is by means of the polymerase chain reaction.

35. An antibody which specifically binds to PAGE-4.

36. The antibody of claim 35, wherein said antibody is a monoclonal antibody.

37. The antibody of claim 35, wherein said antibody is a single chain Fv antibody comprising a variable heavy (V_H) region and a variable light (V_L) region.

38. A cell-growth inhibiting molecule, which molecule comprises a antibody which specifically binds PAGE-4, and an effector molecule.

39. The molecule of claim 38, wherein the antibody is a monoclonal antibody.

40. The molecule of claim 38, wherein the antibody is a scFV.

41. The molecule of claim 38, wherein the effector molecule is a toxic moiety.

42. The molecule of claim 41, wherein the toxic moiety is selected from the group consisting of ricin A, abrin, diphtheria toxin or a subunit thereof, *Pseudomonas* exotoxin or a portion thereof, and botulinum toxins A through F.

43. The molecule of claim 41, wherein the toxic moiety is selected from the group consisting of PE35, PE37, PE38, and PE40.

44. A pharmaceutical composition comprising the molecule of claim 38.

45. A pharmaceutical composition comprising the molecule of claim 41.

46. A pharmaceutical composition comprising the molecule of claim 42.

47. A pharmaceutical composition comprising the molecule of claim 43.

50. A kit for detecting PAGE-4 protein in a sample, said kit comprising:

(i) an anti-PAGE-4 antibody; and

(ii) instructions printed on a tangible medium, said instructions describing the methods of using and uses for said antibody for detecting the PAGE-4 protein.

51. A kit for detecting a PAGE-4 gene in a sample, said kit comprising:

(i) an isolated nucleic acid sequence which specifically hybridizes to a portion of the PAGE-4 gene; and

(ii) instructions printed on a tangible medium, said instructions describing the methods of using and uses for said isolated nucleic acid sequence to detect PAGE-4 in a sample.